Analytical Studies Branch

EMPLOYMENT GENERATION BY SMALL PRODUCERS IN THE CANADIAN MANUFACTURING SECTOR

by

John Baldwin*, Garnett Picot**

No. 70

Research Paper Series

Statistics Canada Statistique Canada

Canada

ANALYTICAL STUDIES BRANCH
RESEARCH PAPER SERIES

The Analytical Studies Branch Research Paper Series provides for the circulation, on a pre-publication basis, of research conducted by Branch staff, visiting Fellows and academic associates. The Research Paper Series is intended to stimulate discussion on a variety of topics including labour, business firm dynamics, pensions, agriculture, mortality, language, immigration, statistical computing and simulation. Readers of the series are encouraged to contact the authors with comments, criticisms and suggestions. A list of titles appears inside the back cover of this paper.

Papers in the series are distributed to Statistics Canada Regional Offices, provincial statistical focal points, research institutes, and specialty libraries. Each paper is catalogued on the DOBIS computer reference system and in various Canadian university library reference systems.

To obtain a collection of abstracts of the papers in the series and/or copies of individual papers (in French or English), please contact:

Publications Review Committee
Analytical Studies Branch, Statistics Canada
24th Floor, R.H. Coats Building
Ottawa, Ontario, K1A 0T6
(613) 951-8213

EMPLOYMENT GENERATION BY SMALL PRODUCERS IN THE CANADIAN MANUFACTURING SECTOR

by

John Baldwin*, Garnett Picot**

No. 70

11F0019MPE No. 70
ISBN: 0-662-21703-9

*Micro-Economic Studies and Analysis, Statistics Canada
and Canadian Institute for Advanced Research
Phone: (613) 951-8588

**Business and Labour Markets Analysis, Statistics Canada
Phone: (613) 951-8214
24F, R.H. Coats Building, Ottawa, K1A OT6
FAX: (613) 951-5643

November 1994

This paper has been accepted for publication by The Journal for Small Business Economics

This paper represents the views of the authors and does not necessary reflect the opinions of the Statistics Canada Bureau

Aussi disponible en français

ABSTRACT

This paper uses job turnover data to compare how job creation, job destruction and net job change differ for small and large establishments in the Canadian manufacturing sector. It uses several different techniques to correct for the regression-to-the-mean problem that, it has been suggested, might incorrectly lead to the conclusion that small establishments create a disproportionate number of new jobs. It finds that net job creation for smaller establishments is greater than that of large establishments after such changes are made. The paper also compares the importance of small and large establishments in the manufacturing sectors of Canada and the United States. The Canadian manufacturing sector is shown to have both a larger proportion of employment in smaller establishments but also to have a small establishment sector that is growing in importance relative to that of the United States.

Keywords: Job Turnover, Small Firm Job Growth, Canada/U.S. Comparisons.

SUMMARY

Throughout the last decade, claims have been made about the job creation associated with small firms. It is argued that small firms have been creating a disproportionate number of new jobs. This paper uses a longitudinal data base of establishments from the Canadian manufacturing sector to examine this issue. It uses job change to examine the nature of the differences between small and large establishments in job creation.

Job change is measured as the job growth in establishments where employment is growing, job loss in establishments where employment is declining, and net employment change (the difference between job growth and job loss. The paper compares the rates of job change for nine different size classes.

The rates of change are measured in three different ways in order to test the robustness of the results. First, alternate methods are used to measure the employment base that is used to divide employment change in order to calculate rates of change. Basically, these methods average the employment size for different periods in order to remove random movements in employment that occur over short periods of time. The paper also calculates employment change over different periods—one year and five years—to distinguish between short-run transitory movements and longer-run change.

The finding that consistently emerges is that small establishments have higher rates of job growth and job decline than large establishments. In addition, small establishments consistently have higher rates of net employment growth than do large establishments. Indeed, the former are generally positive and the latter are generally negative. It is indeed the case that the method of averaging affects the size of the differential—but the differential consistently remains.

The paper also compares job growth, job loss, and net employment change in Canada to that of the United States. The data are taken from a special data set that was created to allow for this cross-country comparison. Canadian small establishments are shown to have consistently higher job gain and job loss rates <u>and</u> higher net employment growth in small establishments than do U.S. establishments.

In addition to rates of change, the distribution of employment shares and job turnover shares in Canada and the United States are compared. The smaller size classes not only account for a larger percentage of employment in Canada, they also account for a larger percentage of gross job creation and job destruction.

Gross job turnover is defined as the sum of jobs created and jobs destroyed. The small size classes in both countries account for a greater proportion of total turnover than they do of employment. But the difference between the percentage of total turnover and the percentage of employment accounted for by the smaller size classes is larger in Canada than in the United States.

In order to show the effect of the differential rates of job creation on employment distribution, the share of different size classes over the last twenty years is examined. The percentage of employment in small establishments has been growing over this period but the pace of growth has increased in the last part of the eighties. This corresponds to the period in which the differences in the net job creation performance between small and large establishments was largest.

INTRODUCTION

Small plants and firms are increasingly seen as the vehicle through which jobs are created. They are often portrayed as the key to regeneration and to renewed employment growth. The increasing attention that small plants and firms receive originates in two separate sets of studies—longitudinal analyses that study job creation and destruction for producers in different size classes and cross-sectional studies of the distribution of the share of producer employment by size class.

Job-growth studies, using longitudinal panel data, have observed that small plants and firms are responsible for most of the new job creation in the last decade. This work was pioneered by Birch (1979, 1987) for the United States; but studies done for other countries have found generally similar results (Loveman and Sengenberger, 1991).[1] These studies examine the number of new jobs that are created by growing plants or firms and the number of jobs lost by declining plants or firms and the difference between the two—net employment change. When rates of job creation, job destruction, and net employment change are calculated by size class, smaller plants or firms are generally found to have the highest rates of job creation and job destruction; more importantly, rates of net job change (job creation minus job destruction) are largest in small producers and smallest in large producers, with the former often being positive while the latter are negative.

Studies of the employment share accounted for by different producer size classes have also bolstered the argument that there has been a recent shift to smaller producers. Data from a number of countries indicate that smaller producers have been gaining employment share (OECD, 1985; Davis and Haltiwanger, 1989). This appears true whether the studies use enterprise level or establishment data. Enterprises are ownership units; establishments are production units. Thus, whether the emphasis is on control or production, smaller units have been found to be employing a larger and larger share of employment.

This paper investigates whether the Canadian manufacturing sector has experienced the same increase in the importance of small producers and whether small producers have played a dominant role in job creation as has been reported elsewhere. It does so by examining differences in the performance of plants across different size classes over the period 1970 to 1990. The manufacturing sector is chosen because high quality panel data are available for the twenty-year period from 1970 to 1990. Use of these data ensures that no particular segment of the business cycle will unduly influence the results of the longitudinal analysis.[2] Because employment in large and small producers may not react similarly to business cycle fluctuations, it is important to have enough years to take averages that are not unduly affected by only one or two peaks or troughs associated with the business cycle.

Job creation and destruction can be calculated either using plants (establishments) or firms (enterprises). Plants rather than firms are chosen here for the analysis in order to focus on whether changes in the size of the production unit are at the basis of the structural shift to smaller producers.

Recently, Davis, Haltiwanger, and Schuh (1993) argue that too much emphasis has been placed on small-firm or small-plant job creation—that evidence from job-growth studies is based on a statistical fallacy. They show that when various corrections are made for regression-to-the-mean, small plants and firms in the United States no longer display higher rates of net job creation (gross

job creation minus gross job destruction) than larger plants and firms. The Canadian results that are reported here use a similar correction procedure, as well as several others. By doing so, this study allows comparisons to be drawn between Canada and the United States as to differences in the net job creation experienced by plants of different sizes. A recent study (Baldwin, Dunne, and Haltiwanger, 1994) finds striking similarities in job creation and destruction in Canada and the United States when long-run averages for the manufacturing sector as a whole are compared; but it does not compare the performance of different size classes. This paper extends the comparison to examine whether large and small plants differ in their contribution to net job change.

In order to investigate the changing importance of small units, this study looks first at job creation and destruction by plant size class. With the use of longitudinal panel data, producers' growth and decline can be followed across size classes and the extent to which growth is purely transitory and quickly reversed or whether it involves long-term trends can be ascertained.

The study then investigates changes in the size distribution of producers. The size-distribution evidence complements the longitudinal job-growth studies. Small plants may increase their employment share because large plants are in decline or because many new smaller plants are being born. An interpretation of size-distribution evidence requires the type of information that job-change studies provide. In turn, size-distribution studies are needed to corroborate the results of longitudinal job-growth studies. Because of the claim that statistical fallacies beset some longitudinal job-change studies, the results of these studies have to be set against the evidence on changes that are occurring in size-distributions. Second, the size-distribution studies allow an order of magnitude to be placed on the size-class differences found in job-change studies. It is not enough just to show that small plants may be creating more jobs than large plants; it is important to know how this is affecting the employment size distribution.

Job-Change Measures of Small-Plant Importance

Job creation is measured as the difference in employment in plants where employment is growing; job destruction as the difference in employment in plants where employment is declining. Net employment growth is the difference between job creation and job destruction. While the concept of job creation and destruction is straightforward, the details of measurement and interpretation are sufficiently complex that they need some discussion.

Measurement and Methodological Issues

Several measurement and methodological criticisms have been levied at studies that have observed small plants and firms are disproportionately important in the job-creation process.

The first criticism is that some data sources only imperfectly measure employment change. Data drawn from Dun and Bradstreet records, which have been employed by Birch in his pioneering U.S. studies, have been criticized for not being particularly accurate with regard to employment counts, for providing only partial coverage in the small plant or firm sector, and as having identifiers attached to plants and firms that sometimes falsely suggest deaths when a plant simply undergoes an ownership change.[3]

The second criticism is that proponents of the importance of small plants and firms sometimes fail to distinguish between gross and net job creation. While it is admitted that small producers may have very high rates of gross job creation, it should be observed that they also have high rates of gross job destruction. It is net job change—the difference between gross job creation and gross job destruction that matters.

The third criticism is that the measurement of the rate of change of employment in small producers fails to account for several statistical phenomena. First, it is sometimes argued that studies of job creation and destruction fail to correct for the regression-to-the-mean phenomenon. Leonard (1986) argues that if plants and firms have a long-run size from which they are temporarily disturbed because of random fluctuations that are rapidly reversed, producers that have most recently grown as a result of these perturbations will be the most likely to decline. Conversely, producers that have most recently declined will be the most likely to increase. (See Madinier, 1986). The large firm segment will have a disproportionate number of firms that have just grown as a result of these random perturbations and the small firm segment will have a disproportionate number of those that have just declined. If so, job-growth statistics will show small producers growing on net and job-loss data will show large producers declining, even though there is no underlying (long term) change in the relative size of producers. In this case, the picture of growth in small firms and decline in larger firms would be solely due to transitory employment change.

A second problem that is sometimes ignored is the truncation or boundary condition that causes net job growth to be positive in small producers and negative in larger producers even when growth is completely random—that is, in situations where small producers have the same probability of growing or declining as do large producers. This occurs because small size classes are bounded below by zero and large size classes are bounded above by the upper limit on producer size. Random

fluctuations in producer size in each size class that are unrelated to producer size will, therefore, cause net job growth to be positive in the smallest size classes because the lower tail of possible rates of decline is truncated while the upper tail of growth rates for small producers is unaffected. The reverse is true for larger size classes. Even in industries where there is no overall growth and where small producers are not contributing to overall employment, there still should be positive net employment growth in small producers as employment randomly fluctuates in all producers. As such, the existence of positive net growth in small producers does not necessarily indicate that small producers are becoming any more important in an industry or that they are contributing to total employment growth.

A related criticism is that rates of net job change fail by themselves to capture the importance of a size class. Small-producer size classes can have high rates of job creation but make rather small contributions to the total number of jobs created or destroyed. In order to evaluate the effect of the high rates of job creation, information on the distribution of employment is required.

In investigating job growth and destruction by size class, this paper addresses each of these criticisms. For data, it uses longitudinal panel data from Statistics Canada's Census of Manufactures, an accurate and comprehensive data base that tracks individual establishments annually over a twenty year time period. Secondly, it corrects for regression-to-the mean phenomena in several ways. Third, it examines how the differences in rates of net job change are translated into shifts in the distribution of employment.

There are a number of other issues that this study does not examine. The importance of small producers can be measured in dimensions other than just employment—using shipments, or value-added, or total wages paid. Small producers may be increasing their share of employment but decreasing their share of production if they have become less productive relative to larger producers. The relative productivity of small producers is dealt with elsewhere (Baldwin, 1994b). This study also does not examine the quality of the jobs that are being produced by small producers—whether the wages paid are less than in larger producers, whether labour force turnover is greater, whether the jobs are less permanent.

Measures of Job Creation and Destruction

Performance will be measured here in terms of employment change between years, using micro data collected at the establishment level. Employment is calculated as the sum of all production and non-production workers. For short-run calculations, employment changes are measured between adjacent years. For longer-run calculations, changes are measured over a two- and five-year period.

Job change between two years t and t+1 is measured by:

a) gross job creation in period t to t+1—the summation of employment gains for all plants that expanded between periods t and t+1. This includes employment creation both in new plants and in continuing plants whose employment grew.

b) gross job destruction in period t to t+1—the summation of employment losses for all plants that contracted between periods t and t+1. This includes employment destruction both in closures and in continuing plants whose employment declined.

c) net employment change in period t to t+1—the difference in employment between t and t+1. This is equal to the difference between gross job creation and gross job destruction.

These calculations were derived from a longitudinal plant-level data base that was constructed from an annual census of manufacturing plants. It covers the period from 1970 to 1990. This file has been carefully constructed to prevent the false birth and death problem that besets other data bases like Dun and Bradstreet. The details of the construction of the dataset and the tests that have been employed on it can be found in Baldwin and Gorecki (1990a, 1990b). Establishments are linked to owning enterprises in this data base and, therefore, changes both at the plant and the firm level can be calculated. The Canadian data come from a source comparable to the American data used by Davis, Haltiwanger, and Schuh (1993). To enhance further the comparability of the Canadian results to those of the United States, the samples and definitions were carefully harmonized.[4]

In order to transform gross job creation and destruction into measures of *rates* of job change, employment change is divided by a measure of plant size. The most commonly used measure of employment is the base-period average size measure (t). To the extent that there is transitory employment change in any population of firms, this measure will be unduly small for small plants and too large for large plants. If, in any one period, plants that are smaller are more likely to have just declined and to reverse themselves in the next period, and if large plants are more likely to have just grown and to reverse themselves in the next period, then the use of the base-period year will bias job-growth rates upward for small plants and downward for larger plants. Following Davis, Haltiwanger, and Schuh (1993), several additional size measures are employed to correct for this problem. Davis, Haltiwanger and Schuh (1993) average plant size over the year t and t+1—the period over which employment change is measured. This will be referred to as the current-period average size measure.[5] If most of the transitory movement is reversed within two-year periods, the two-year average will correct for this phenomenon.

Transitory fluctuations are not, however, the only cause of employment changes occurring in firms and corrections for transitory fluctuations may introduce other biases. Structural change may be occurring as a plant's employment trends upward or downward. If there is trend growth or decline, the current-period size measure biases the size of the plant experiencing that growth relative to other plants whose employment is essentially steady—down for a plant that is declining and up for a plant that is growing. For example, a firm with real growth over period t and t+1 will be classified as larger using the current-period average and thus its measured rate of growth will be smaller. Yet there is no reason to classify this plant as larger than it actually was at the beginning of the period—since its growth was not due to transitory fluctuations.

If the average plant size for the years t and t-1 is used (what will be referred to as the previous-period average size measure), the opposite bias is obtained when trend growth is important. Since the biases due to trend growth are offsetting in the two measures but since both essentially handle the problem of transitory fluctuations equally well, both methods—the previous-period average (t-1 to t) and the current-period average (t to t+1)—are used to classify a plant, to calculate the rate of change by size class and then they are averaged. This measure is referred to here as the multi-period average plant-size measure.[6]

Correction for short-term random fluctuations was also accomplished in a second manner—by comparing short and longer-run measures of job turnover.[7] The multi-period measure abstracts from short-run performance, but does so only when calculating plant size. It does not average changes in employment. If a major portion of employment change is transitory, then it is not only plant size (the denominator for the rate calculation) but also change in employment (the numerator) that need to be averaged. To do so, plants are divided into growers and decliners on the basis of employment change between period t and t+1 but employment change is calculated over two and five years—from t to t+2 and from t to t+5. This allows for the possibility that change is rapidly reversed. If short-run performance is not correlated with longer-run performance because of the transitory fluctuations in size, these longer-run measures should show different patterns from the short-run measures.[8] These two measures will be referred to as the short-run cumulative rates of change—"short run" because plants are divided on the basis of annual change, and "cumulative" because the employment change is cumulated over several periods.

As indicated, there may be both short and long-run regression-to-the-mean taking place in a population of producers. Small plants may generally grow while the larger plants may be in decline. Baldwin (1995) investigates the extent to which this has been taking place in the Canadian manufacturing sector over the last two decades. The use of full-period average plant size, calculated over the entire period of study, has been advocated by Davis, Haltiwanger, and Schuh (1993) as a means of correcting this longer-run regression-to-the-mean phenomenon. Annual employment change is divided by the employment of the plant based on its average size calculated over the entire period of study.

While this approach is also presented here for the sake of comparison to the comparable U.S. measure, a caveat needs to be appended. It is not clear whether a finding that net employment change is constant across size classes when full-period average size is used necessarily implies that small plants are not creating a disproportionate number of jobs at any one point in time. Consider the case where small plants are the dynamic element in the economy, where growing small entrants essentially replace declining large plants and the growth from small to large and the decline from

large to small is completed over the time period used to calculate full-period average size. Then all change from this group of decliners and growers would essentially be assigned to the centrally located size class in the plant size distribution. Using the full-period average plant-size approach, growers would be allocated to a centrally located point on the size distribution, having grown from bottom to top. Declining plants would also be located there, having moved from a point high in the distribution to the bottom. Gross job creation in the former would just offset gross job destruction in the latter and net employment change would be zero for this centrally located size class. Elsewhere in the plant size distribution, growth and decline would essentially offset one another and net change in each size class would be zero—because these plants by definition are neither long-term growers nor decliners and, thus, must have essentially offsetting gross job creation and gross job destruction due to transitory fluctuations. The result is that, when long-term size is used, the rate of net job growth and destruction by size class is likely to be relatively similar for all size classes and if there is little net addition to employment in the industry as a whole, close to zero for most size classes. Nevertheless, small plants in this scenario are clearly important. They are the engine of the change that is taking place. Use of the full-period average plant size corrects for regression-to-the-mean but in a fashion that is not helpful since it incorrectly implies in this case that small plants are not important—a conclusion that contradicts the constructed facts in this example.[9]

Because of the shortcomings of the exercise that uses full-period average size, we employ an alternative statistic to shed light on the nature of the structural (longer-term) growth and decline in different portions of the plant-size distribution. This is the <u>long-run five-year cumulative rate</u> of job creation and destruction. Plants are classified as growing or declining on the basis of their employment change between t and t+5 (as opposed to between t and t+1 as in the previous exercise) and then their cumulative performance over 5 years is calculated. Use of the longer period for classification (as opposed to the one-year period previously used to classify plants as growers or decliners), permits longer-run trends to be investigated. Measurement over the long run permits an evaluation of the extent to which genuine trends as opposed to transitory movements in relative plant position are occurring. For the five-year cumulative measure, plant size is defined as the average over the preceding two years—years t and t-1.

Dynamic Growth Paths and the Interpretation of Job-Creation and Job-Destruction Data

In order to interpret the results of job-creation and job-destruction studies, it is important to have a model of the operation of markets. Otherwise, it is difficult to specify the job-growth patterns that might be used to infer that small plants were important dynamic factors in the growth process. Consider a situation where a change in technology or a shift in demand is accompanied by the entry of new small plants. In the short run, employment growth in the small-plant sector will increase. What happens to net growth by size class will depend on the nature of the substitution effect, if any, with other plants and on the growth pattern of these small plants subsequent to entry. If the growth of new small plants does not displace existing plants, then the small-plant size class will show positive net employment growth in the short run. If new small plants replace only other small plants, there will be no effect on net employment growth in either the small- or the large-plant sector. If there is any replacement of large plants by the growth of small plants, then the net effect will be to produce positive net employment growth in small plants and negative net employment growth in large plants. In this case, dynamic growth is consistent with zero or positive net growth in small plants.

In the longer run, at least two major scenarios are possible. First, if there is no new entry, new small plants do not grow and the rest of the world remains static, then the net job-creation rates based on both the base-year and multi-period measures will decline for small firms. Second, existing small plants may grow as they learn to produce the new product in larger quantities and to move down a learning curve. In this case, small plants eventually become large and the gross job creation attributed to this cohort now becomes assigned to a larger size class, whether size is being measured by base-year size or by full-period average size. With no substitution effect, and no new cohort of plants, gross and net employment growth now become larger in the middle and upper size classes.

Of course, changes in size-class employment at any point in time will be the result of employment changes taking place simultaneously in a sequence of cohorts, which differ from one another by age. Some will have just entered the population. Others will have progressed from small to medium size. Others will have moved into the larger size classes. What happens in the smallest cohort will be the result primarily of recent entrants. Since progress up the size rung occurs slowly, changes in the middle and larger rungs will be the result of the dynamics of older plants. In a state where several cohorts are added together, net growth should be positive in both small and medium and perhaps large size classes, as each size class will be positively affected by at least one of the new cohorts.

In summary, then, the difference between the net employment growth rates for different size classes are partial and indirect measures that describe the dynamic path of adjustment of producers in an industry and need to be employed in conjunction with other measures. This dynamic involves a disequilibrium or adjustment process. Of course, the dynamics described above will not take place instantaneously. In the short run, evidence of a structural change will be felt first in the smaller size classes. It is in this segment where we will look for evidence to see if a major structural shift has occurred in the last twenty years in the manufacturing sector. But it must be recalled that evidence of the emergence of a new group does not necessarily mean that small plants will remain more important in the future. If the new small plants are part of a single wave of births (a generation of baby boomers), a short-run expansion of the small-plant sector may be associated with a future

contraction in small size classes as these plants mature and move up the size distribution. The latter would occur if the new cohort has arisen because it has discovered a host of new technologies that will eventually be exploited at larger and larger scale. On the other hand, these new cohorts will remain small if the new technologies are best exploited at smaller scale and if the learning process that previously allowed scale and scope economies to emerge as a dynamic process are no longer relevant.

In order to sort out the possible alternate interpretations of the job-turnover data, the paper also examines the changes that have been occurring in the plant size distribution over time.

MEASURES OF THE RATE OF JOB CREATION AND DESTRUCTION

Job change includes both transitory and structural components. Alternate measures are used here to remove the transitory component. This is done first by the manner in which the establishment is sized—by taking initial size or by averaging it over several periods—and second, by the length of time over which the employment change is calculated.

Measures of Single-Period Job Change

These measures all use one-period employment change but they adopt different approaches to measuring the plant size that is used to calculate the rate of job creation or destruction.

(1) Base Year —uses establishment size in year t—a measure that makes no attempt to remove the transitory component from the base. The remaining three single-period measures calculate average plant size in difference ways.

(2) Current Year—uses establishment size in year t and t+1.

(3) Previous Year—uses establishment size in year t and t-1.

(4) Multi-period—average of current-year and previous-period measures—thus essentially employs size at year t-1 and t+1

(5) Full-period—average of all years used in the analysis.

Measures of Multi-Period Job Change

All these measures use previous-year average size to size the plant and to measure the base against which employment change is measured. They differ in how the transitory component is averaged out from the measure of employment change.

(a) Using One-Year Performance—plants are classified as growing or declining based on their performance between year t and t+1;

(1) Two-Year Short- Run Cumulative—growth is determined by measurement between years t and t+2.

(2) Five-Year Short- Run Cumulative—growth is determined by measurement between years t and t+5.

(b) Using Multi-Year Performance—plants are classified as growing or declining based on their performance between year t and t+5.

(1) Five-Year Long- Run Cumulative—growth is determined by measurement between years t and t+5.

Job Creation and Destruction by Size Class

a) Rates of Job Turnover in Canada

Rates of job creation and destruction are reported in Tables 1 and 2 using the base-year and the multi-period average plant size measures.[10]

The most commonly reported rates of job creation and destruction are those derived from the base-year case (Table 1). They show that gross job creation is largest for smaller plants and declines more or less monotonically across plant-size classes—from 28.8 percent for plants with less than 20 employees to about 3.9 percent for plants with more than 5000 employees. It is also the case that smaller plants lose jobs at a higher rate than other classes and that the rate of gross job destruction declines as plants become larger. Gross job-loss rates decline from 17.5 percent in the smallest category to 5.1 per cent in the largest category. The net effect of gross job creation and gross job destruction is positive in the smallest size classes. Plants of less than twenty employees have an 11.3 percent net employment growth rate, those in the range of 20 to 50 employees have a 3.8 per cent growth rate. The largest size classes—above 100 employees—all have negative rates of net employment growth. It is differences such as these that have been used to argue for the importance of small-plant growth.

At issue is whether the basic pattern of positive net employment growth for the smallest size classes and negative growth for the largest size classes changes when the other variants are used. Calculating job-change rates using the one-year multi-period size measure (Table 2) reduces the size of the net change in the smallest class; nevertheless, it remains positive.[11] The multi-period calculations also have a wider range of plants showing positive net growth than does the base-year case. Plants up to 250 employees have positive net growth.

Both the base-year and multi-period measures use employment change calculated over only one year. The two- and five-year short-run cumulative measures in Tables 3 and 4 allow us to investigate whether the plants that grew or declined over one year continued to do so in the longer run. If all of the employment change in the short run is transitory and involves regression-to-the-mean, then looking at longer-run performance on the basis of two- and five-year growth rates will yield no distinguishable pattern by size class. However, in both cases, the smallest size classes show positive net employment change while the larger size classes exhibit negative net change. Thus, plants that are growing in the short run also continue to do so in the longer run. It is of interest to note that once again more of the smaller size classes show positive net growth for the five-year cumulative measure than for the short-run measure that uses base-year size.

In order to better separate growers from decliners, plants were divided into these two categories on the basis of five-year employment change (as opposed to one year changes in the previous cases). The cumulative five-year change based on comparing employment at five-year endpoints is included in Table 5. It shows once again that the smaller size classes all experience a larger amount of growth than decline in employment. When plants are divided on the basis of five-year performance—a period over which transitory change is likely to be less important than change due to trend growth—the pattern of growth by smaller plants and decline by larger plants is unquestionable.

These trends are removed when full-period average size is used for classification purposes (Table 6). It is, therefore, not surprising that the rates of change that use full-period average plant size yield results that are different from the others. Nevertheless, net growth is still positive for two of the smaller size classes, although it is also positive for the second largest size class.

In summary, the patterns in the job-growth and job-decline rates are similar and yield the same qualitative conclusions for almost all variants of the estimates—base year, multi-period, short-run two- and five-year cumulative, and long-run five-year cumulative measures. Gross job-growth and job-loss rates generally decline across size classes. In addition, the pattern of positive net employment change in smaller size classes and negative net employment change in larger size classes consistently emerges. It is these results which have given rise to the contention that small plants are the dynamos of change.

Table 1:

Job Turnover By Size Class Using Base-Year Size Class (average 1970-90)

Size Class	Job Change Rates Using Base-Year Size		
	Job Creation	Job Destruction	Net Change
0 to 19	28.8	17.5	11.3
20 to 49	18.0	14.2	3.8
50 to 99	12.6	11.9	0.7
100 to 249	9.0	9.7	-0.7
250 to 499	6.8	8.4	-1.6
500 to 999	5.1	7.3	-2.2
1000 to 2499	4.9	6.6	-1.7
2500 to 5000	5.8	6.6	-0.8
5000 +	3.9	5.1	-1.2

Table 2:

Job Turnover By Size Class Using Multi-Period Size (average 1970-90)

Size Class	Job Change Using Multi-Period Plant Size		
	Job Creation	Job Destruction	Net Change
0 to 19	29.0	21.6	7.4
20 to 49	18.8	15.0	3.8
50 to 99	13.2	11.6	1.6
100 to 249	9.5	9.2	0.3
250 to 499	7.2	7.8	-0.6
500 to 999	5.7	6.8	-1.1
1000 to 2499	5.1	6.0	-0.9
2500 to 5000	6.6	6.7	-0.1
5000 +	4.0	4.4	-0.4

Table 3:

Job Growth By Size Class Using Two-Year Short-Run Cumulative Measures (1971-1990)

Size Class	Job Change Using Two Year End-Point Change		
	Job Creation	Job Destruction	Net Change
0 to 19	49.7	16.2	33.5
20 to 49	29.4	13.4	16.0
50 to 99	19.4	11.9	7.5
100 to 249	12.1	10.2	1.9
250 to 499	7.8	9.4	-1.6
500 to 999	5.8	8.4	-2.6
1000 to 2499	5.0	7.1	-2.1
2500 to 4999	7.5	6.8	0.7
5000 +	3.3	5.5	-2.2

Table 4:

Job Growth By Size Class Using Five-Year Short-Run Cumulative Measures

Size Class	Job Change Using Five Year End-Point Change		
	Job Creation	Job Destruction	Net Change
0 to 19	69.8	15.9	53.9
20 to 49	44.0	13.8	30.2
50 to 99	28.2	13.2	15.0
100 to 249	14.8	12.4	2.4
250 to 499	7.1	12.2	-5.1
500 to 999.	4.4	11.5	-7.1
1000 to 2499	4.0	9.2	-5.2
2500 to 4999	6.5	11.0	-4.5
5000 +	1.2	5.5	-4.3

Table 5:

Job Growth By Size Class Using Two-Year Long-Run Cumulative Measures (1971-1990)

Size Class	Job Change Using Five Year End-Point Change		
	Job Creation	Job Destruction	Net Change
0 to 19	134.4	42.9	91.5
20 to 49	84.7	32.8	51.9
50 to 99	55.0	27.9	27.1
100 to 249	31.8	24.5	7.3
250 to 499	19.2	22.2	-3.0
500 to 999.	14.6	19.6	-5.0
1000 to 2499	13.5	16.4	-2.9
2500 to 4999	16.5	16.5	0.0
5000 +	7.3	11.4	-4.1

Table 6:

Job Growth By Size Class Using Full-Period Average Size Measures

Size Class	Job Change Rates Using Average Size		
	Job Creation	Job Destruction	Net Change
0 to 19	21.5	22.3	-0.8
20 to 49	18.2	16.3	1.9
50 to 99	13.1	12.6	0.5
100 to 249	9.7	10.5	-0.8
250 to 499	7.7	8.8	-1.1
500 to 999.	6.1	7.9	-1.8
1000 to 2499	5.2	6.0	-0.8
2500 to 4999	8.8	6.6	2.2
5000 +	4.0	4.4	-0.4

b) Comparisons of Canada and U.S. Job Performance

Davis, Haltiwanger and Schuh (1993) have noted that small plants in the United States are not the dynamic force that many have claimed. They argue that when corrections are made for the regression-to-the mean phenomenon, small U.S. plants and firms are no longer found to account for a disproportionate amount of net job creation.

In order to compare their results for the United States to those for Canada, job-turnover rates by size class for the two countries are plotted in Figures 1, 2, and 3 using base-year plant size, current-period plant size and full-period average size, respectively. When base-year plant size is used (Figure 1), both countries are seen to have similar patterns of net plant growth—largest in the smallest size classes and gradually declining as size class increases. The smallest size classes have positive net growth, the largest have negative net growth. But in Canada, positive net growth occurs in more small-plant size classes.

The patterns of gross job creation and job destruction across size classes are remarkably similar, except that both gross job-growth and job-decline rates are larger in the smaller size classes in Canada than the United States. The reverse is true in the larger size classes. Small plants in Canada are a more dynamic group than their U.S. counterparts.

When current-period plant size is used (Figure 2), the net employment curve no longer resembles an negative exponential curve.[12] For the U.S., the curve is upward sloping, with the smallest size classes experiencing the largest decline in employment. For Canada, moving from base-year to current-period plant size reduces the magnitude of the net employment contribution made by the smaller size classes, but it remains positive. Once more, the cross size-class pattern of gross job creation and destruction are similar, with Canadian job creation being higher in smaller plants. Canadian job destruction is about the same in smaller plants but less in larger plants than in the United States. Thus, while the use of current-period rather than base-year plant size might change the conclusion that in the U.S small size classes are those where the highest positive net contributions are being made to employment, this is not the case in Canada. When corrections for short-run regression-to-the-mean are made, Canadian small plants still appear to be more dynamic than do American small plants.

The third comparison uses full-period average size (Figure 3). Once more, Canadian job-growth and job-decline rates are higher than for the United States in the smaller size classes. Net growth does not differ much across size classes in the United States. In Canada, the net growth curve also becomes flatter; but there are three size classes that have positive net growth in employment. In Canada, two small size classes (20-49 and 50-99) and a large class (2500-5000) make a positive net contribution to employment.

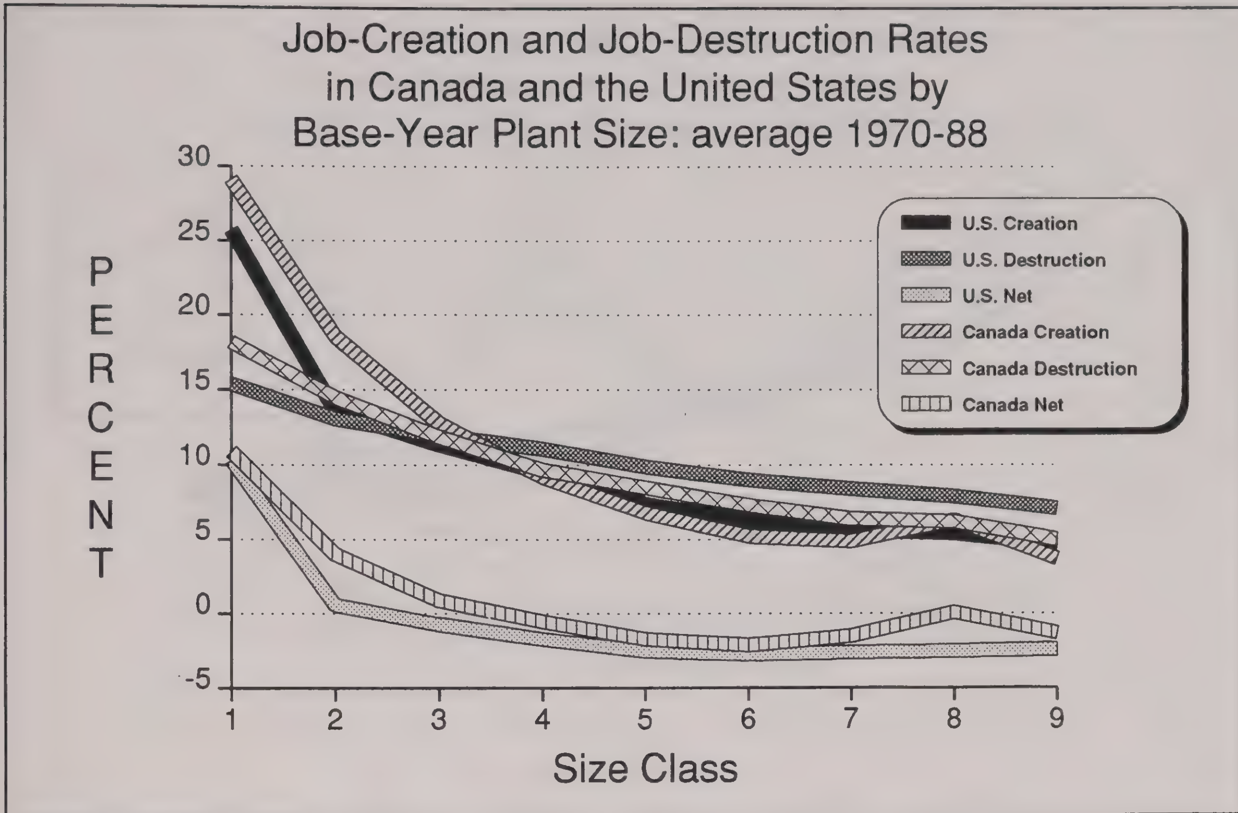

Figure 1: Canada-U.S. Base-Year Comparisons

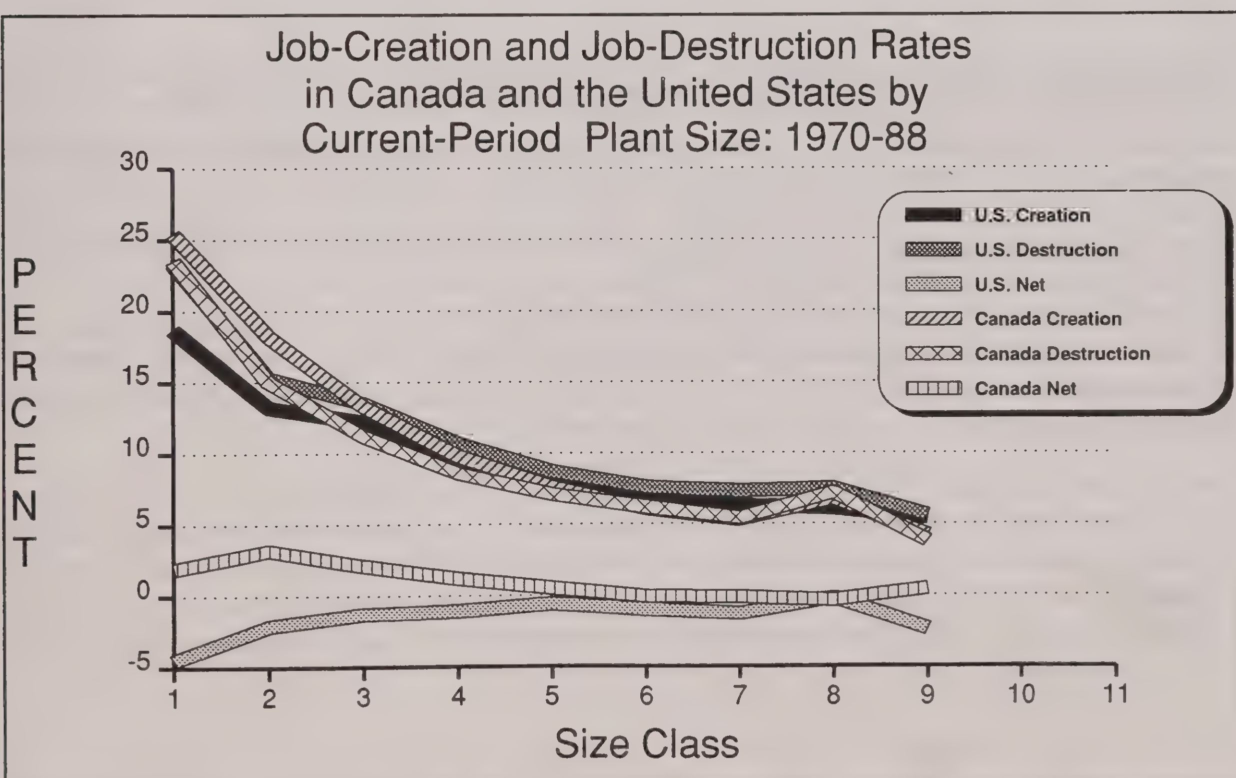

Figure 2: Canada-U.S. Current-Period Comparisons

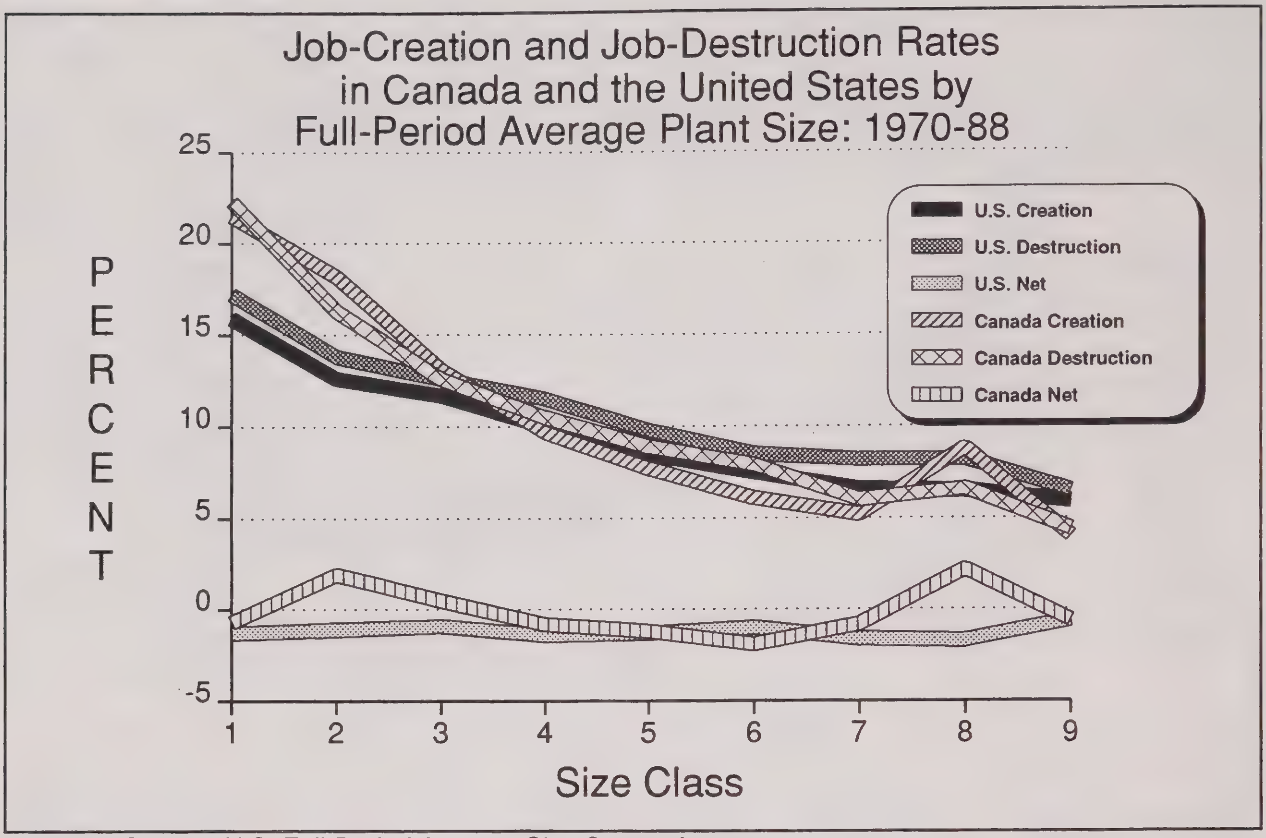

Figure 3: Canada-U.S. Full-Period Average Size Comparison

c) Distribution of Job Creation and Destruction in Canada and the United States

Generally then, job-growth and job-decline rates are higher in Canada than in the United States for smaller size classes. The relative importance of size classes in creating jobs can also be assessed by examining the distribution of job gain and job loss by size class and by comparing it to the distribution of employment in the two countries.

Before differences in the distributions of job gain and loss are examined, it is important to compare differences in the size distribution of total employment in general in the manufacturing sectors of the two countries. Small plants may create more jobs in Canada than the United States simply because they account for a greater share of employment.

The distribution of employment by plant-size class in the manufacturing sector for Canada and the United States is presented in Figure 4. Alternate definitions of plant size are used to examine whether the findings are sensitive to the definition used. Small plants are more important in Canada than in the United States for both definitions. Canada has a larger percentage of employment in plants below 249 employees. The United States advantage in the larger size classes is largest for plants above 2500 employees.

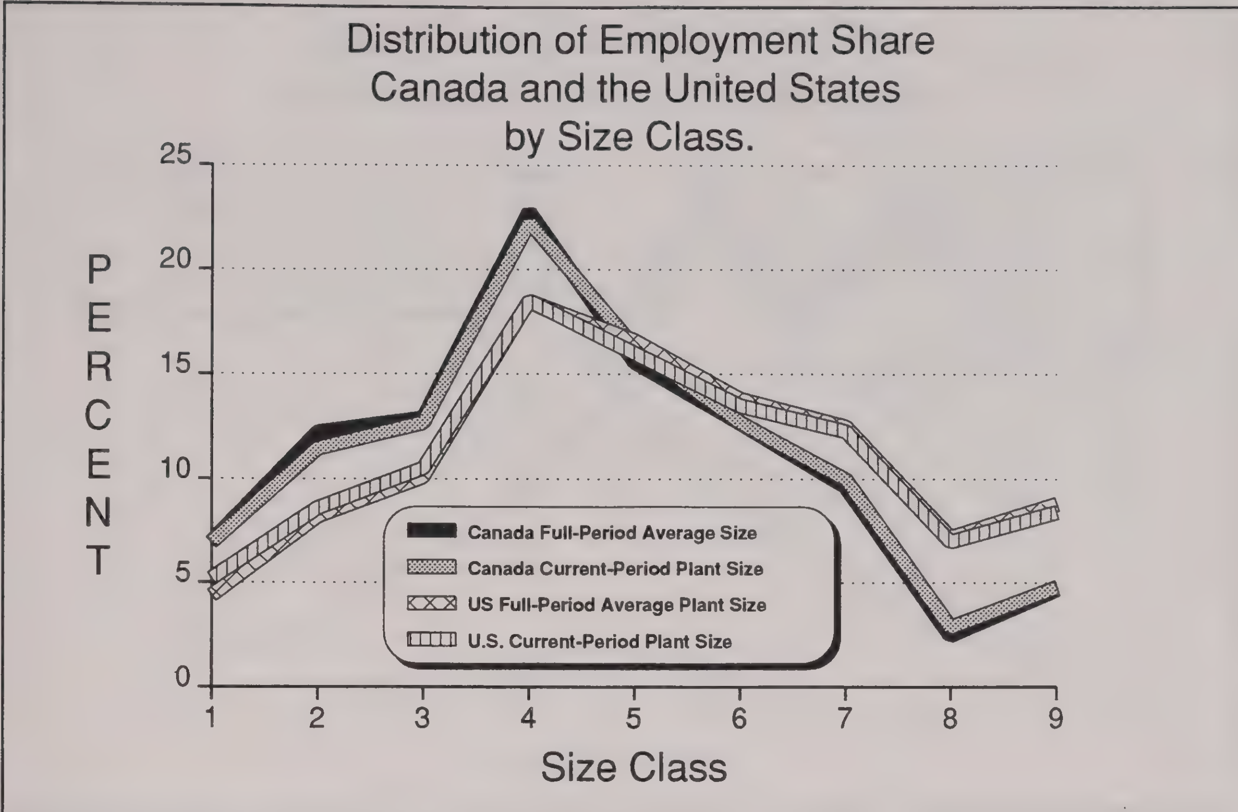

Figure 4: Canada and U.S. Distribution of Employment

The distributions of job gain and job loss are presented in Figures 5 and 6, respectively, using two separate definitions of plant size—current-period and full-period average size. Both diagrams show that Canada has a greater share of job gain and job loss in the smaller size classes than does the United States.

Thus, the smaller size classes not only account for a larger percentage of employment in Canada, they also account for a larger percentage of gross job creation and destruction. This suggests that gross job creation plus gross job destruction (total job turnover) in a size class is related to the importance of a size class—as measured by its share of total employment. Job turnover occurs as competition and productivity change relocate employment from one plant to another within a size class. This turnover would be proportional to employment if competition takes place primarily among plants within a size class—that is, if there are barriers to mobility.

While gross job creation and destruction are related, it is important to ask how employment turnover differences between Canada and the United States are related to employment share differences. To examine this, the distribution of total turnover—gross job gain plus gross job loss—is plotted in Figure 7, along with the employment distribution.[13] Total turnover is a measure of the total amount of change that is taking place as jobs are transferred from declining to growing plants. It is apparent that in both countries, small size classes account for a greater proportion of total turnover than they do of employment. Small size classes are in this sense more volatile than large size classes in both countries. But it is significant that the difference between the percentage of turnover and the

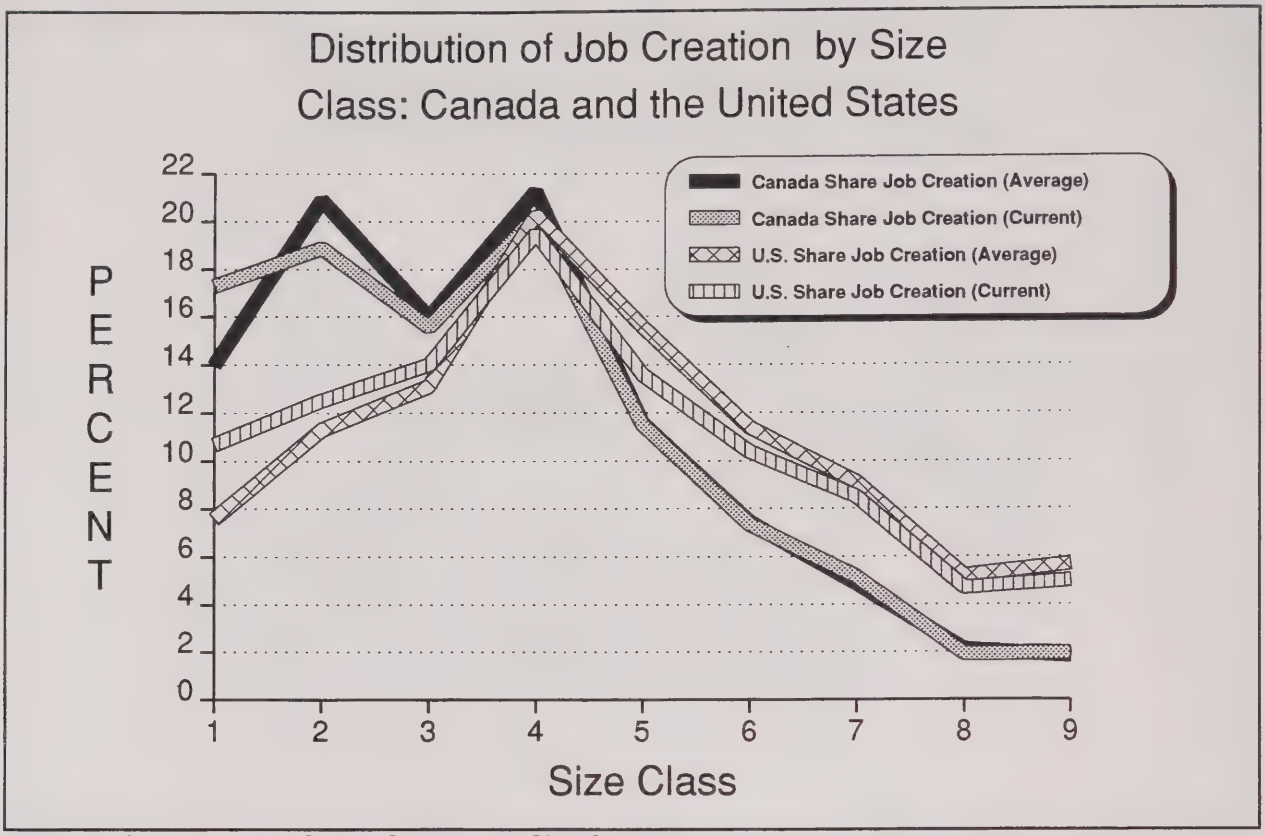

Figure 5: Canada and U.S. Job Creation by Size Class

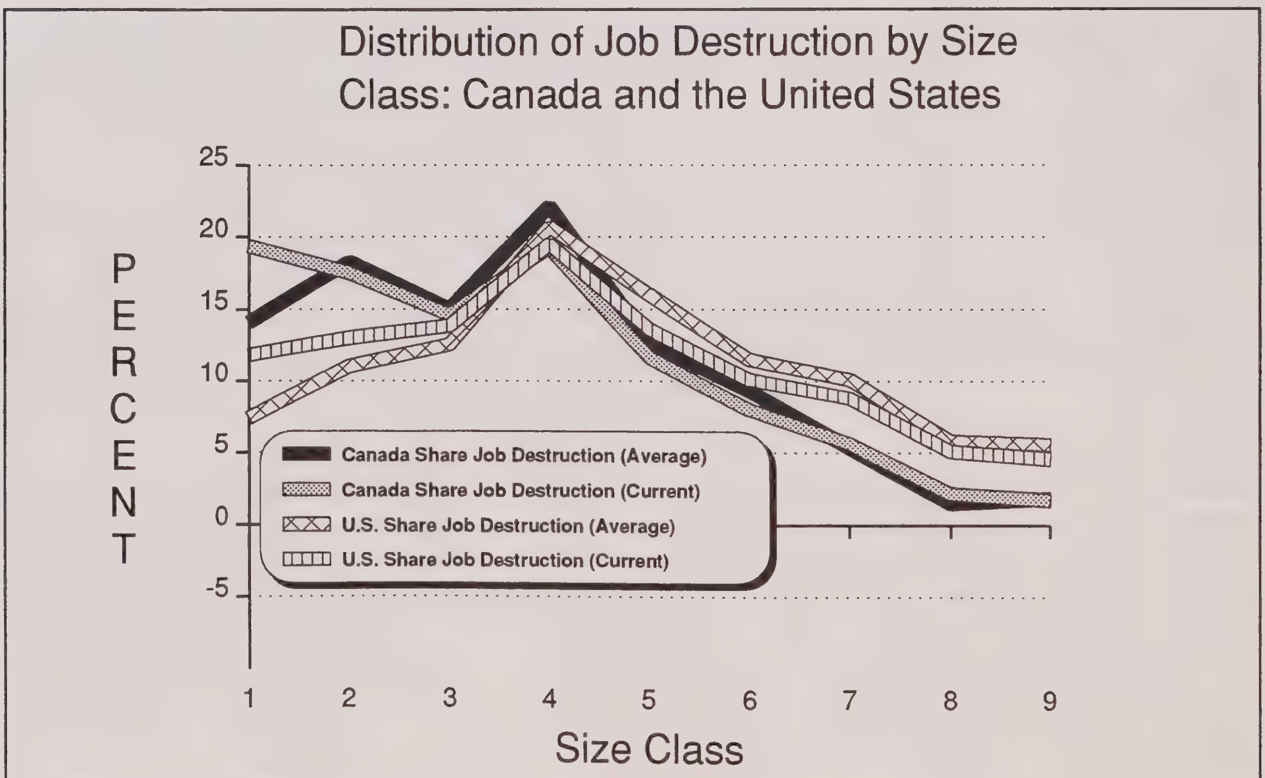

Figure 6: Canada and U.S. Job Destruction by Size Class

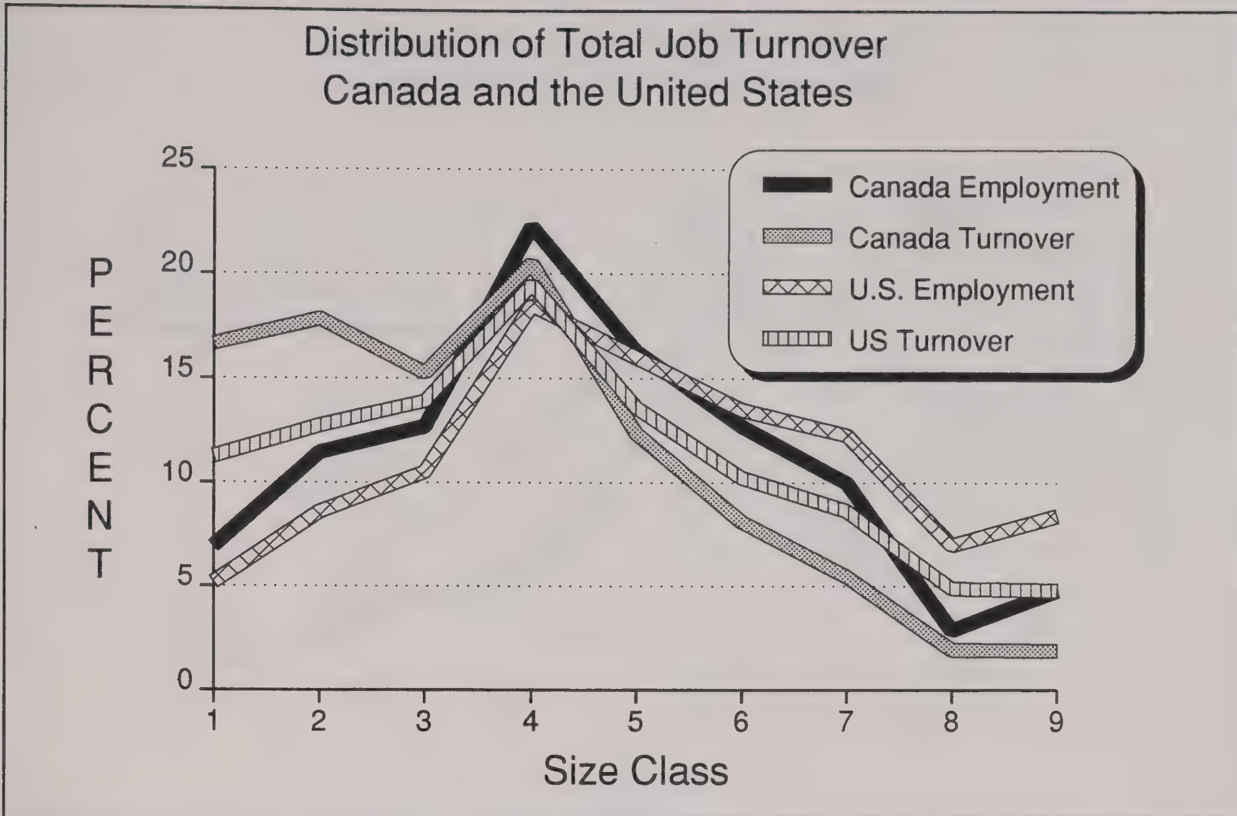

Figure 7: Canada and U.S. Total Job Turnover by Size Class

percentage of employment accounted for by the smaller size classes is larger in Canada than in the United States.

d) Small Plants and the Size Distribution

In the previous sections, this paper has examined the importance of small plants by looking at employment turnover and net employment growth by size class. An alternate and more direct measure of the importance of small plants is the size distribution. If the observation that small plants are generating more new jobs than large plants is not just the result of statistical illusion, and these plants do not grow too quickly to become large plants, small plants might be expected to account for a larger share of employment today than twenty years ago.

To show the changes brought about by rapid growth in the small plant segment, the shares of gross job creation and destruction derived from the long-run five-year cumulative totals are graphed in Figure 8. The use of longer-run averages allows trends to emerge in the data. The share of gross job creation in the first three size classes is larger than their share of gross job destruction. This demonstrates the importance of the dynamics at work in small plants. Plants that start in the smallest size classes generate more than their proportion of jobs in the long run—whether jobs are defined on a gross or net basis. If most of these plants stay in the size class in which they start, we might expect the share of these size classes to increase over time.

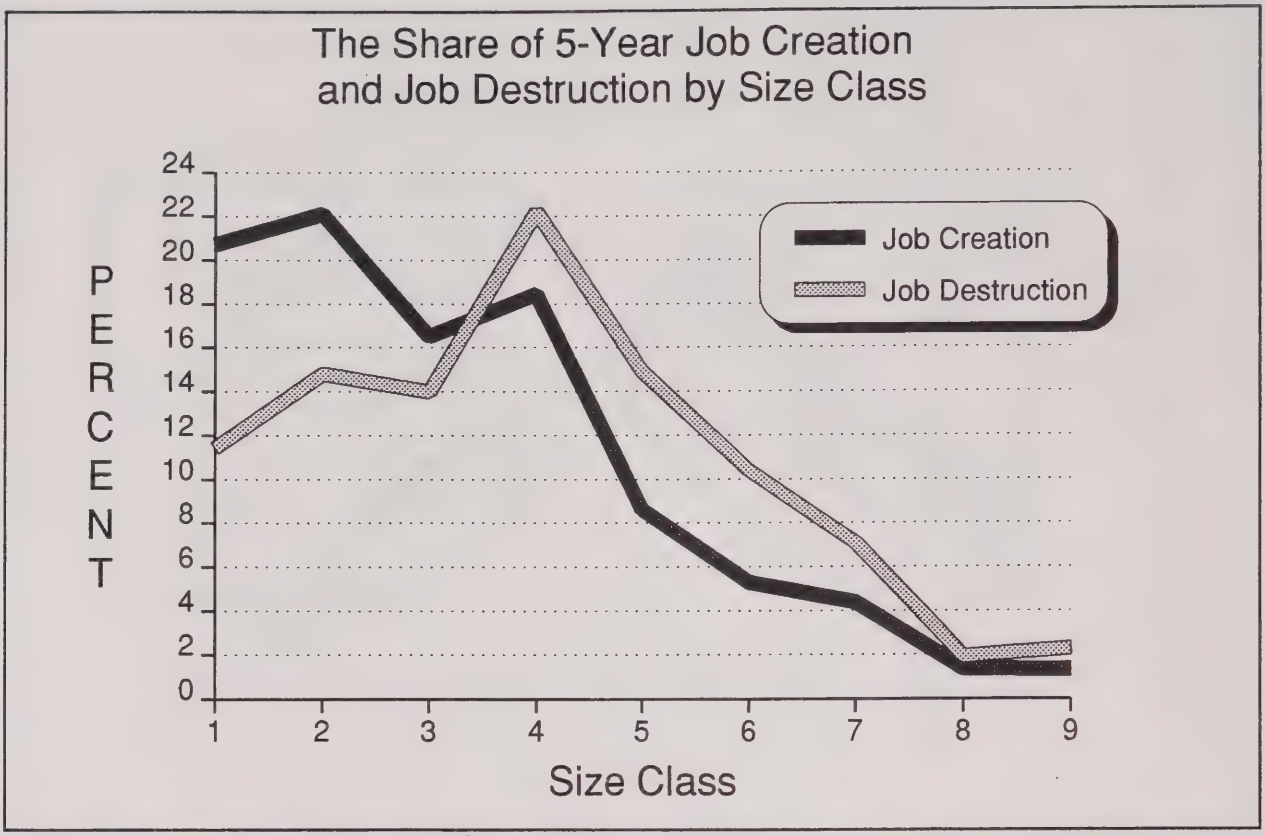

Figure 8: Distribution of Long-run Job Growth and Decline

This is the case. The employment distribution in manufacturing by size class is plotted in Figure 9 for the years 1970, 1980, 1984, and 1989. The three smaller size classes—those up to 100 employees—account for more of total employment by the end of the period than at the beginning. Small plants have become more important.

The data in Figure 9 indicate that much of the shift in the employment distribution took place in the latter part of the eighties. To illustrate this point, the percentages accounted for each of the three smaller size classes for the years 1970 to 1990 are plotted in Figure 10. While these three classes as a whole have been increasing their share of employment since 1975, the growth in their share has been particularly large for the period from 1982 to 1989. This tendency is not concentrated in one industrial sector. It occurs broadly across a wide range of manufacturing industries.

To test the hypothesis that net job creation in small size classes has increased in the latter period, net job-change rats using the previous-period base year are plotted in Figure 11 for the 1970s and for the 1980s. Net job change in the smaller size classes has become larger in the latter period. The story that is told both by the size distribution and by the job-creation and job-destruction data is the same. Small firms have become increasingly important in the manufacturing sector during the 1980s. It is also evident that in the 1980s large firms were in decline. Their rates of net decline were larger in the 1980s than in the 1970s. The change then in the employment size distribution toward smaller firms was the result both of greater growth in the small sector and greater decline in the large-plant sector.

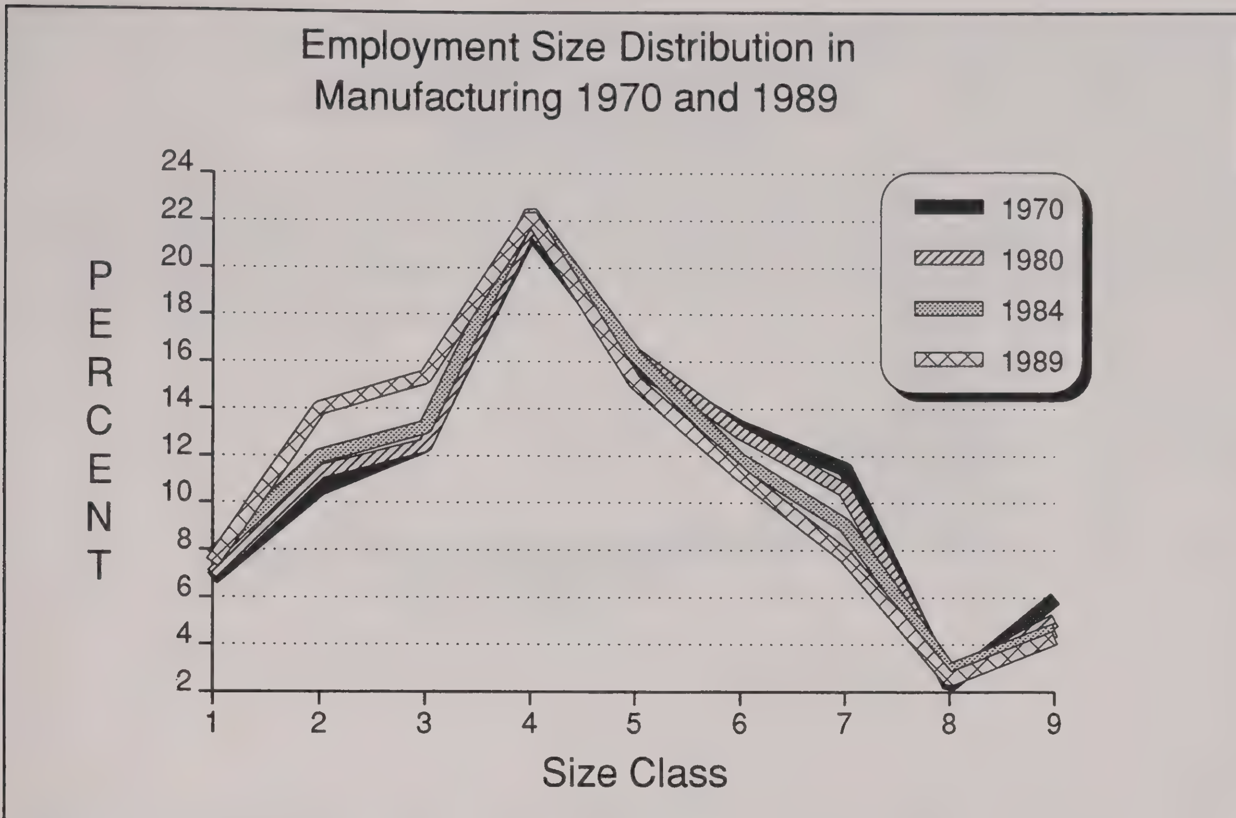

Figure 9: Change in Canadian Employment Size Distribution

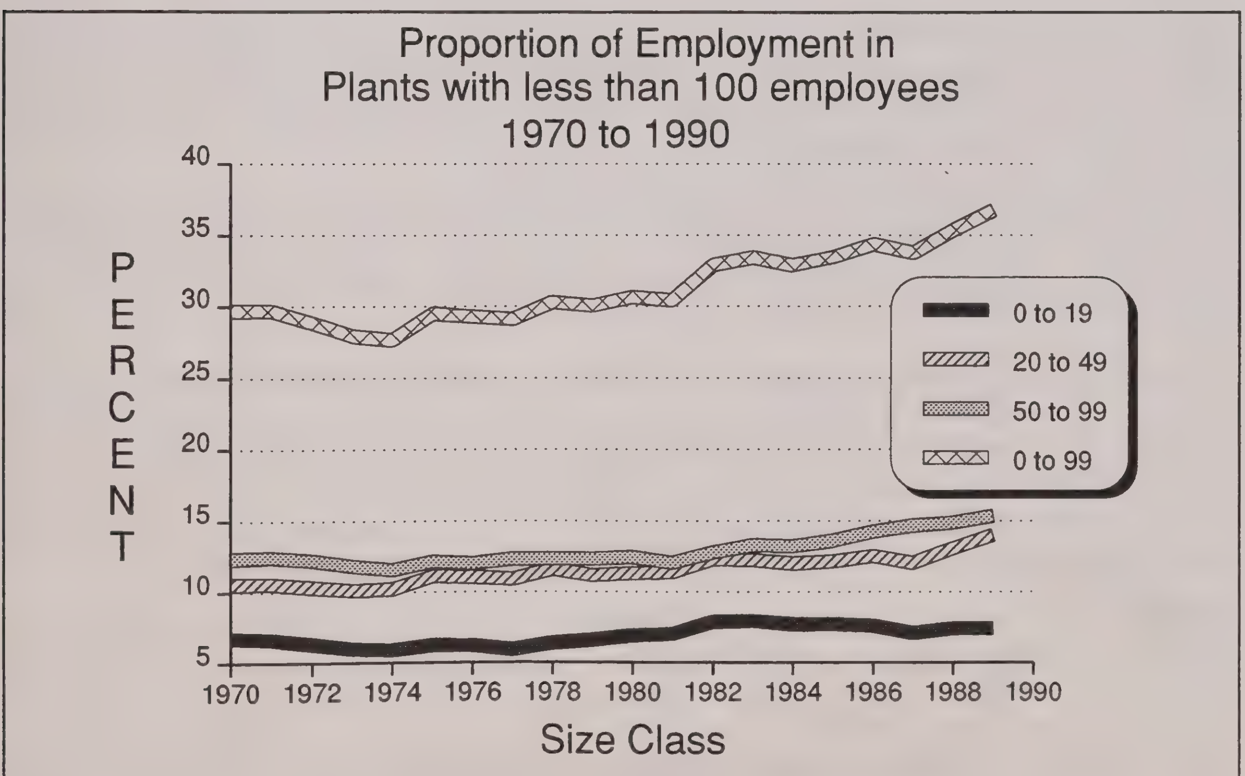

Figure 10: Changing Importance of Small Plants: 1970-90

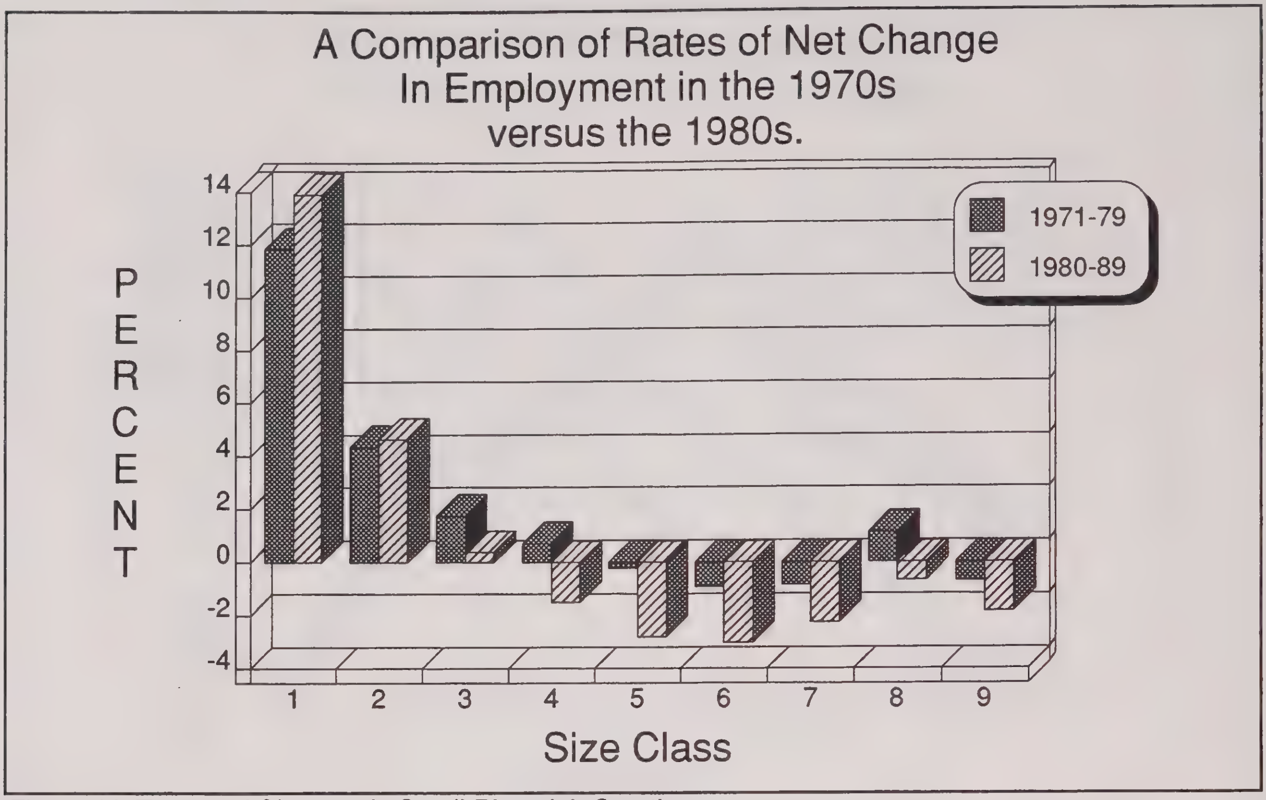

Figure 11: Temporal Changes in Small-Plant Job Creation

In summary, the size-distribution data corroborate the increasing importance of small plants in the Canadian manufacturing sector. Smaller size classes not only account for a disproportionate share of new jobs, they are also increasing in relative importance. The increasing importance of small plants in Canada is not a statistical illusion.

This is the case. The employment distribution in manufacturing by size class is plotted in Figure 9 for the years 1970, 1980, 1984, and 1989. The three smaller size classes—those up to 100 employees—account for more of total employment by the end of the period than at the beginning. Small plants have become more important.

The data in Figure 9 indicate that much of the shift in the employment distribution took place in the latter part of the eighties. To illustrate this point, the percentages accounted for by each of the three smaller size classes for the years 1970 to 1990 are plotted in Figure 10. While these three classes as a whole have been increasing their share of employment since 1975, the growth in their share has been particularly large for the period from 1982 to 1989. This tendency is not concentrated in one industrial sector. It occurs broadly across a wide range of manufacturing industries.

To test the hypothesis that net job creation in small size classes has increased in the latter period, net job-change rates using the previous-period base year are plotted in Figure 11 for the 1970s and for the 1980s. Net job change in the smaller size classes has become larger in the latter period. The story that is told both by the size distribution and by the job-creation and job-destruction data is the same. Small firms have become increasingly important in the manufacturing sector during the 1980s.

It is also evident that in the 1980s large firms were in decline. Their rates of net decline were larger in the 1980s than in the 1970s. The change then in the employment size distribution toward smaller firms was the result both of greater growth in the small-plant sector and greater decline in the large-plant sector.

In summary, the size-distribution data corroborate the increasing importance of small plants in the Canadian manufacturing sector. Smaller size classes not only account for a disproportionate share of new jobs, they are also increasing in relative importance. The increasing importance of small plants in Canada is not a statistical illusion.

CONCLUSION

The statistical evidence demonstrates that small Canadian producers in the manufacturing sector have been increasing in importance during the last twenty years. This shift occurred because more jobs were being created than were being lost in small plants. The reverse was occurring in large plants. As a result of new plants and the growth in these plants which added jobs to smaller plants yet still left these plants in the smaller size classes, the share in employment in smaller size classes (those plants less than 100 employees) increased over the period.

Thus growth in the small sector occurred both because of a decline in larger plants and because of a multiplication of new smaller plants. The growth in the relative importance of the small plant sector did not occur just by default, because large plants were in decline. The number of small plants actively expanded during this period of time.

The reasons for this change are not clear. They may lie in changing technology that allows for shorter product lines and permits smaller firms to compete with larger firms that previously enjoyed advantages from economies of scale. The expansion may also be related to labour cost advantages. There is evidence that newer firms are paying lower wages relative to incumbents than was once the case (Baldwin, 1994). The expansion may be the result of outsourcing—as larger firms subcontract out a portion of their parts or fabrication requirements. Further research is required to decide which of these explanations is more appropriate.

Additional studies are also required to evaluate the effect of the expansion of small plants on industrial performance. Before conclusions can be drawn about the desirability of the process that has been outlined herein, more data are required on the nature of the new jobs being produced in the small plant sector. This paper has not pursued the issue of whether the quality of jobs that are being produced compare with those being lost. To do so, wages and productivity of the new smaller plants can be compared to those being lost. Worker turnover in new plants can be compared to old. The permanence of the jobs being created can be examined. These are subjects which we shall address in the future.

NOTES

1. See also OECD, 1987; Storey and Johnson, 1987 for studies of other countries.

2. For an earlier Canadian study that examines manufacturing as well as other sectors from 1978 to 1986, see Baldwin and Gorecki (1990a). An update of this work can be found in Picot, Baldwin, and Dupuy (1994).

3. For problems with Dun and Bradstreet files, see Armington and Odle (1982), Birch and MacCracken (1983), Johnson and Storey (1985), and Davis, Haltiwanger and Schuh (1993).

4. In particular, head offices and establishments with less than 5 employees were excluded.

5. Following Davis, Haltiwanger, and Schuh (1993), both previous- and current-period measures average employment in both periods for all plants—including both entrants and deaths. This implies that the maximum for the index ranges from -2 to +2. The average size so calculated is used to place the plant in a particular size class.

6. In calculating full-period average plant size, the mean size of births and closures was calculated only for those years with positive values of employment so as to provide comparable statistics to the results produced by Davis, Haltiwanger and Schuh (1993) for the United States.

7. Baldwin and Gorecki (1990) compare one-year and five-year job change statistics in order to distinguish short-run transitory effects from longer-run trends.

8. In a later section, we use current-period rather than multi-period measures that duplicate the Davis, Haltiwanger, and Schuh (1993) definition so that comparisons can be made to their calculations for the United States.

9. For these calculations, average size is taken as a two-year average for the years immediately preceding the period of measurement. All plants including births and deaths are included in these calculations and the average that is calculated in this measure is used to assign the plant to a particular size class.

10. These rates are all weighted averages—the sum of all employment change in all plants assigned to a size class divided by the sum of employment in the size class.

11. The two components that are used to calculate the multi-period average size measure are presented in Appendix A. The first uses the average of the plant size between t-1 and t (previous-period average size); the second uses the average of the plant size between t and t+1 (current-period average size).

12. For this comparison, current-period plant size measures were used that follow the definition followed by Davis, Haltiwanger, and Schuh (1993)—that is, using the average plant size for periods t and t+1.

13. In both cases, current-period average size is used.

REFERENCES

Armington, C. and M. Odle. 1982. "Small Business—How Many Jobs?" *The Brookings Review* 1: 14-17.

Baldwin, J.R. and P.K. Gorecki. 1990a. *Structural Change and the Adjustment Process: Perspectives on Firm Growth and Worker Turnover*. Ottawa: Economic Council of Canada.

Baldwin, J.R. and P.K. Gorecki. 1990b. "Measuring Firm Entry and Exit with Panel Data," in A.C. Singh and P. Whitridge (eds) *Analysis of Data in Time*. Ottawa: Statistics Canada.

Baldwin, J.R. 1994. "Productivity Growth, Plant Turnover and Restructuring in the Canadian Manufacturing Sector." unpublished paper presented to a conference on Productivity Growth sponsored by the National Institute for Economic and Social Research, London England.

Baldwin, J.R. 1995. *The Dynamics of Industrial Competition: A North American Perspective*. Cambridge: Cambridge University Press. forthcoming 1994.

Baldwin, J.R, T. Dunne, and J. Haltiwanger. 1994. "A Comparison of Job Creation and Job Destruction in Canada and the United States." Working Paper No. 4726. National Bureau of Economic Research.

Birch, D. 1979. *The Job Generation Process*. Final Report to Economic Development Administration. Cambridge, MA. MIT Program on Neighbourhood and Regional Change.

Birch, D. 1987. Job Creation in America: *How our Smallest Companies Put the Most People to Work*. New York: The Free Press.

Birch, D. and S, MacCracken (1983) "The Small Business Share of Job Creation: Lessons Learned from the use of a Longitudinal File". Unpublished report, MIT Programme on Neighbourhood and Regional Change.

Davis, S.J. and J. Haltiwanger. 1989. "The Distribution of Employees by Establishment Size: Patterns of Change and Movement in the United States, 1962-85". Mimeo, University of Chicago, Graduate School of Business, November.

Davis, S.J., J. Haltiwanger, and S. Schuh. 1993. "Small Business and Job Creation: Dissecting the Myth and Reassessing the Facts." Working Paper No. 4492. National Bureau of Economic Research.

Johnson, S. and D. Storey. 1985. "Job Generation: An International Survey, U.S. and Canadian Job Generation Studies Using Dun and Bradstreet Data: Some Methodological Issues". Research Working Paper 1, University of Newcastle-upon-Tyne, Newcastle. U.K.

Leonard, J. S. 1986. On the Size Distribution of Employment and Establishments. Working Paper No. 1951. National Bureau of Economic Research.

Loveman, G. and W. Sengenberger. 1991. "The Re-emergence of Small-Scale Production: an International Comparison". *Small Business Economics*. 3: 1-37.

MacDonald, J. 1985. "Dun and Bradstreet Business Microdata Research Applications and the Detection and Correction of Errors". *Journal of Economic and Social Measurement* 13: 173-85.

Madinier, H. 1986. "Les créations and disparitions d'emplois en France de 1982 à 1984." *Dossiers statistiques du travail et de l'emploi* 23-24 (December): 75-83.

Organization of Economic Cooperation and Development. 1985. "Employment in Small and Large Firms: Where have the Jobs Come From?" *Employment Outlook*. Paris. pp. 64-82.

Organization of Economic Cooperation and Development. 1987 "The Process of Job Creation and Job Destruction." *Employment Outlook*. Paris. pp. 97-220.

Picot, G., J.R. Baldwin and R. Dupuy. 1994. "Have Small Firms Created Disproportionate Share of New Jobs in Canada? A Reassesment of the Facts. " Unpublished Paper, Analytical Studies Division, Statistics Canada.

Storey,D.J. and S. Johnson. 1987. *Small and Medium-Sized Enterprises and Employment Creation in the EEC Countries: Summary Report*. Commission of the European Communities, Programme of Research and Actions on the Development of the Labour Market, Study No. 85/407.

APPENDIX A: Job Change Using Current-Period and Previous-Period Average Plant Size

Table 7:

Job Turnover by Size Class Using Current-Period Average (1970-1990)

Size Class	Job Change Using Current Plant Size		
	Job Creation	Job Destruction	Net Change
0 to 19	25.4	23.5	2.0
20 to 49	18.2	15.0	3.2
50 to 99	13.3	11.2	2.1
100 to 249	9.8	8.6	1.2
250 to 499	7.6	7.1	0.5
500 to 999.	6.1	6.2	-0.1
1000 to 2499	5.3	5.4	-0.1
2500 to 4999	6.8	7.2	-0.4
5000 +	4.2	3.8	0.4

Table 8:

Job Turnover by Size Class Using Previous-Period Average (1971-1990)

Size Class	Job Change Using Previous-Period Average Change		
	Job Creation	Job Destruction	Net Change
0 to 19	32.6	19.6	13.0
20 to 49	19.4	14.9	4.5
50 to 99	13.0	12.0	1.0
100 to 249	9.2	9.7	-0.5
250 to 499	6.8	8.4	-1.6
500 to 999.	5.2	7.3	-2.1
1000 to 2499	4.9	6.5	-1.6
2500 to 4999	6.3	6.2	0.1
5000 +	3.7	5.0	-1.3

ANALYTICAL STUDIES BRANCH
RESEARCH PAPER SERIES

No.

1. *Behavioural Response in the Context of Socio-Economic Microanalytic Simulation,* ***Lars Osberg***

2. *Unemployment and Training,* ***Garnett Picot***

3. *Homemaker Pensions and Lifetime Redistribution,* ***Michael Wolfson***

4. *Modelling the Lifetime Employment Patterns of Canadians,* ***Garnett Picot***

5. *Job Loss and Labour Market Adjustment in the Canadian Economy,* ***Garnett Picot and Ted Wannell***

6. *A System of Health Statistics: Toward a New Conceptual Framework for Integrating Health Data,* ***Michael C. Wolfson***

7. *A Prototype Micro-Macro Link for the Canadian Household Sector,* ***Hans J. Adler and Michael C. Wolfson***

8. *Notes on Corporate Concentration and Canada's Income Tax,* ***Michael C. Wolfson***

9. *The Expanding Middle: Some Canadian Evidence on the Deskilling Debate,* ***John Myles***

10. *The Rise of the Conglomerate Economy,* ***Jorge Niosi***

11. *Energy Analysis of canadian External Trade: 1971 and 1976,* ***K.E. Hamilton***

12. *Net and Gross Rates of Land Concentration,* ***Ray D. Bollman and Philip Ehrensaft***

13. *Cause-Deleted Life Tables for Canada (1972 to 1981): An Approach Towards Analyzing Epidemiologic Transition,* ***Dhruva Nagnur and Michael Nagrodski***

14. *The Distribution of the Frequency of Occurence of Nucleotide Subsequences, Based on Their Overlap Capability,* ***Jane F. Gentleman and Ronald C. Mullin***

15. *Immigration and the Ethnolinguistic Character of Canada and Quebec,* ***Réjean Lachapelle***

16. *Integration of Canadian Farm and Off-Farm Markets and the Off-Farm Work of Women, Men and Children,* ***Ray D. Bollman and Pamela Smith***

17. *Wages and Jobs in the 1980s: Changing Youth Wages and the Declining Middle,* ***J. Myles, G. Picot and T. Wannell***

18. *A Profile of Farmers with Computers,* ***Ray D. Bollman***

19. *Mortality Risk Distributions: A Life Table Analysis,* ***Geoff Rowe***

20. *Industrial Classification in the Canadian Census of Manufactures: Automated Verification Using Product Data,* ***John S. Crysdale***

21. *Consumption, Income and Retirement,* ***A.L. Robb and J.B. Burbridge***

22. *Job Turnover in Canada's Manufacturing Sector,* ***John R. Baldwin and Paul K. Gorecki***

23. *Series on The Dynamics of the Competitive Process,* ***John R. Baldwin and Paul K. Gorecki***

    A. *Firm Entry and Exit Within the Canadian Manufacturing Sector.*
    B. *Intra-Industry Mobility in the Canadian Manufacturing Sector.*
    C. *Measuring Entry and Exit in Canadian Manufacturing: Methodology.*
    D. *The Contribution of the Competitive Process to Productivity Growth: The Role of Firm and Plant Turnover.*
    E. *Mergers and the Competitive Process.*
    F. *(in preparation)*
    G. *Concentration Statistics as Predictors of the Intensity of Competition.*
    H. *The Relationship Between Mobility and Concentration for the Canadian Manufacturing Sector.*

24. *Mainframe SAS Enhancements in Support of Exploratory Data Analysis,* ***Richard Johnson and Jane F. Gentleman***

25. *Dimensions of Labour Market Change in Canada: Intersectoral Shifts, Job and Worker Turnover,* ***John R. Baldwin and Paul K. Gorecki***

26. *The Persistent Gap: Exploring the Earnings Differential Between Recent Male and Female Postsecondary Graduates,* ***Ted Wannell***

27. *Estimating Agricultural Soil Erosion Losses From Census of Agriculture Crop Coverage Data,* ***Douglas F. Trant***

28. *Good Jobs/Bad Jobs and the Declining Middle: 1967-1986,* ***Garnett Picot, John Myles, Ted Wannell***

29. *Longitudinal Career Data for Selected Cohorts of Men and Women in the Public Service, 1978-1987,* ***Garnett Picot and Ted Wannell***

30. *Earnings and Death - Effects Over a Quarter Century,* ***Michael Wolfson, Geoff Rowe, Jane F. Gentleman adn Monica Tomiak***

31. *Firm Response to Price Uncertainty: Tripartite Stabilization and the Western Canadian Cattle Industry,* ***Theodore M. Horbulyk***

32. *Smoothing Procedures for Simulated Longitudinal Microdata,* ***Jane F. Gentleman, Dale Robertson and Monica Tomiak***

33. *Patterns of Canadian Foreign Direct Investment Abroad,* ***Paul K. Gorecki***

34. *POHEM - A New Approach to the Estimation of Health Status Adjusted Life Expectancy,* ***Michael C. Wolfson***

35. *Canadian Jobs and Firm Size: Do Smaller Firms Pay Less?,* ***René Morissette***

36. *Distinguishing Characteristics of Foreign High Technology Acquisitions in Canada's Manufacturing Sector,* ***John R. Baldwin and Paul K. Gorecki***

37. *Industry Efficiency and Plant Turnover in the Canadian Manufacturing Sector,* ***John R. Baldwin***

38. *When the Baby Boom Grows Old: Impacts on Canada's Public Sector,* ***Brian B. Murphy and Michael C. Wolfson***

39. *Trends in the distribution of Employment by Employer Size: Recent Canadian Evidence,* ***Ted Wannell***

40. *Small Communities in Atlantic Canada: Their Industrial Structure and Labour Market conditions in the Early 1980s,* ***Garnett Picot and John Heath***

41. *The Distribution of Federal/Provincial Taxes and Transfers in rural Canada,* ***Brian B. Murphy***

42. *Foreign Multinational Enterprises and Merger Activity in Canada,* ***John Baldwin and Richard Caves***

43. *Repeat Users of the Unemployment Insurance Program,* ***Miles Corak***

44. *POHEM -- A Framework for Understanding and Modelling the Health of Human Population,* ***Michael C. Wolfson***

45. *A Review of Models of Population Health Expectancy: A Micro-Simulation Perspective,* ***Michael C. Wolfson and Kenneth G. Manton***

46. *Career Earnings and Death: A Longitudinal Analysis of Older Canadian Men,* ***Michael C. Wolfson, Geoff Rowe, Jane Gentleman and Monica Tomiak***

47. *Longitudinal Patterns in the Duration of Unemployment Insurance Claims in Canada,* ***Miles Corak***

48. *The Dynamics of Firm Turnover and the Competitive Process,* ***John Baldwin***

49. *Development of Longitudinal Panel Data from Business Registers: Canadian Experience,* ***John Baldwin, Richard Dupuy and William Penner***

50. *The Calculation of Health-Adjusted Life Expectancy for a Multi-Attribute Utility Function: A First Attempt,* ***J.-M. Berthelot, R. Roberge and M.C. Wolfson***

51. *Testing The Robustness of Entry Barriers,* ***J. R. Baldwin, M. Rafiquzzaman***

52. *Canada's Multinationals: Their Characteristics and Determinants,* ***Paul K. Gorecki***

53. *The Persistence of unemployment: How Important were Regional Extended Unemployment Insurance Benefits?* ***Miles Corak, Stephen Jones***

54. *Cyclical Variation in the Duration of Unemployment Spells,* ***Miles Corak***

55. *Permanent Layoffs and Displaced Workers: Cyclical Sensitivity, Concentration, and Experience Following the Layoff,* ***Garnett Picot, Wendy Pyper***

56. *The Duration of Unemployment During Boom and Bust*,* ***Miles Corak***

57. *Getting a New Job in 1989-90 in Canada,* ***René Morissette***

58. *Linking Survey and Administrative Data to Study Determinants of Health,* ***P. David, J.-M. Berthelot and C. Mustard***

59. *Extending Historical Comparability in Industrial Classification,* ***John S. Crysdale***

60. *What is Happening to Earnings Inequality in Canada?,* ***R. Morissette, J. Myles and G. Picot***

61. *Structural Change in the Canadian Manufacturing Sector, (1970-1990),* ***John Baldwin and M. Rafiquzzaman***

62. *Unemployment Insurance, Work Disincentives, and the Canadian Labour Market: An Overview*,* ***Miles Corak***

63. *Recent Youth Labour Market Experiences in Canada,* ***Gordon Betcherman and René Morissette***

64. *A Comparision of Job Creation and Job Destruction in Canada and the United States,* ***John Baldwin, Timothy Dunne, John Haltiwanger***

65. *What is Happening to Weekly Hours Worked in Canada?,* ***René Morissette and Deborah Sunter***

68. *The Gender Earnings Gap among Recent Postsecondary Graduates, 1984-92,* **Ted Wannell and Nathalie Caron**

69. *A Look at Employment-Equity Groups Among Recent Postsecondary Graduates: Visible Minorities, Aboriginal Peoples and the Activity Limited,* ***Ted Wannell and Nathalie Caron***

70. *Employment Generation by Small Producers in the Canadian Manufacturing Sector,* ***J. Baldwin, G. Picot***

71. *Have Small Firms Created a Disproportionate Share of New Jobs in Canada? A Reassessment of the Facts,* ***G. Picot, J. Baldwin and R. Dupuy***

For further information, contact the Chairperson, Publications Review Committee, Analytical Studies Branch, R.H. Coats Bldg., 24th Floor, Statistics Canada, Tunney's Pasture, Ottawa, Ontario, K1A 0T6, (613) 951-1804.